Metal content of highly accreting quasars

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1. Introduction

We present an analysis of UV spectra of quasars at intermediate redshifts (z ~2.2) believed to be accreting at a high rate, or extreme Population A (xA) quasars according to Marziani & Sulentic 2014, aimed to estimate the chemical abundances of the broad line emitting gas. We follow the approach described in Sniegowska et al. 2021, and we extend their sample to 36 non-BAL sources. The basis of our analysis are multi-component fits made with the IRAF specfit routine in three regions of the spectra centered at 1900, 1550 and 1400Å in order to deblend the broad components of Al III λ1860, C III] λ1909, C IV λ1549, HeII λ1840 and Si IV + O IV] λ1400 and their blueshifted emission component associated with a prominent outflow.

2. Data and Analysis

The broad and blueshifted components deblend results are shown in Fig. 1. This process was carried out on the entire sample.

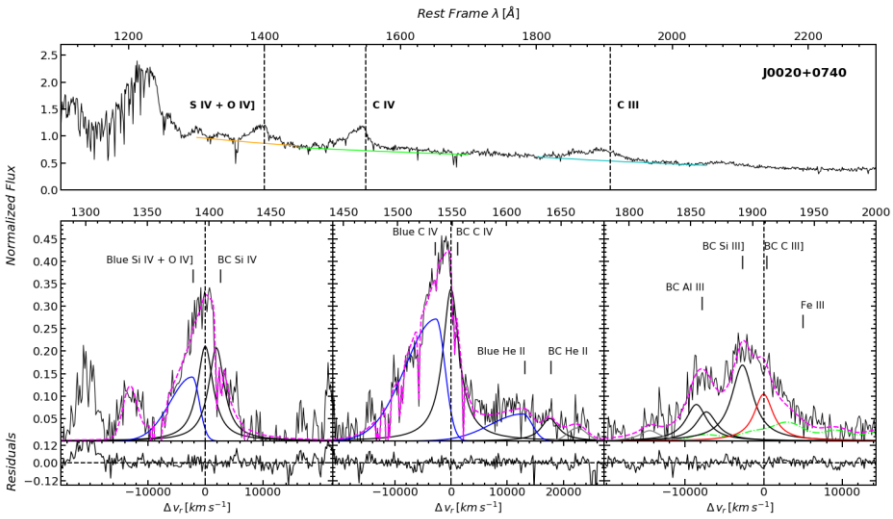

Figure 1. Multi-component fit of a typical object of our sample, J1419+0749.

3. Preliminary Results

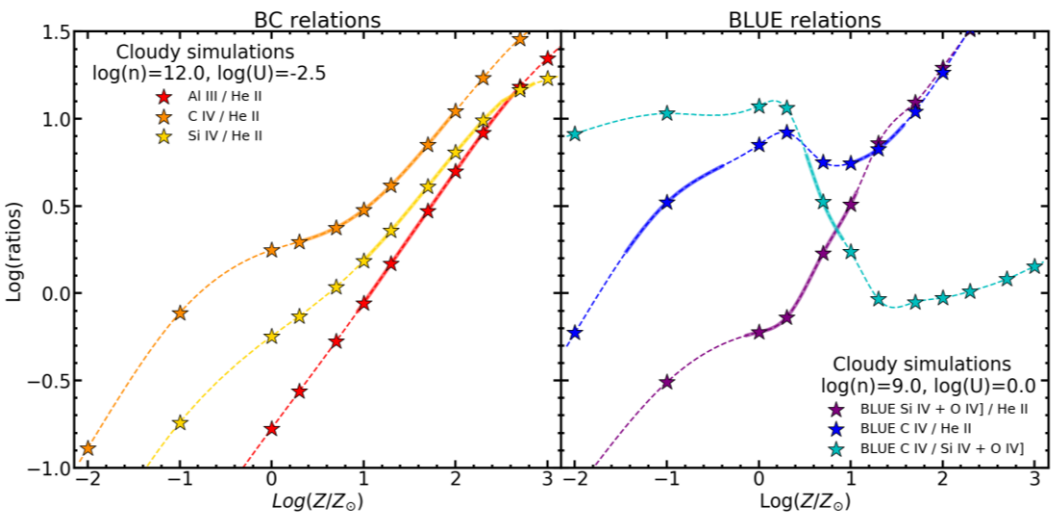

Figure 2. Trends of intensity ratios as a function of metallicity predicted by Cloudy, for physical parameter *U* and n_H fixed. The left panel shows the relations for the BC assuming high n_H and low *U* and the right panel the relations for the blueshifted components assuming lower n_H and high *U*. Note that in the latter case the trend is non monotonic for ratios involving CIV.

In order to interpret specfit results, we computed an array of 667 elements matrix using the photoionization code Cloudy 17.02 (Ferland et al. 2017) and its AGN SED. Each matrix is a case for fixed ionization parameter ($-4.5 \leq log(U) \leq 1.00$) and density ($7.00 \leq log(n_H) \leq 14.00$), this process was repeated for 12 cases of chemical composition (from 0.01 to 1000 $Z_\odot$). By comparing the observed flux ratios to the same ratios predicted by Cloudy we found that **the virialized clouds (broad components) present a metallicity around ~30 $Z_\odot$** confirming the previous results obtained by Sniegowska et al. (2021), **if Al III λ1860 is included in the computations**. Estimates based on the C IV/HeII ratio suggest significantly lower $Z \sim 10\text{-}20$ $Z_\odot$, confirming that the **very high Z values might be the result of elemental pollution**, as suggested by Śniegowska et al. (2021).

4. References

Śniegowska et al 2021 ApJ 910 115
Marziani, P., & Sulentic, J. W. 2014, MNRAS, 442, 1211
Ferland G. J., Chatzikos M., Guzmán F. et al 2017 RMxAA 53 385